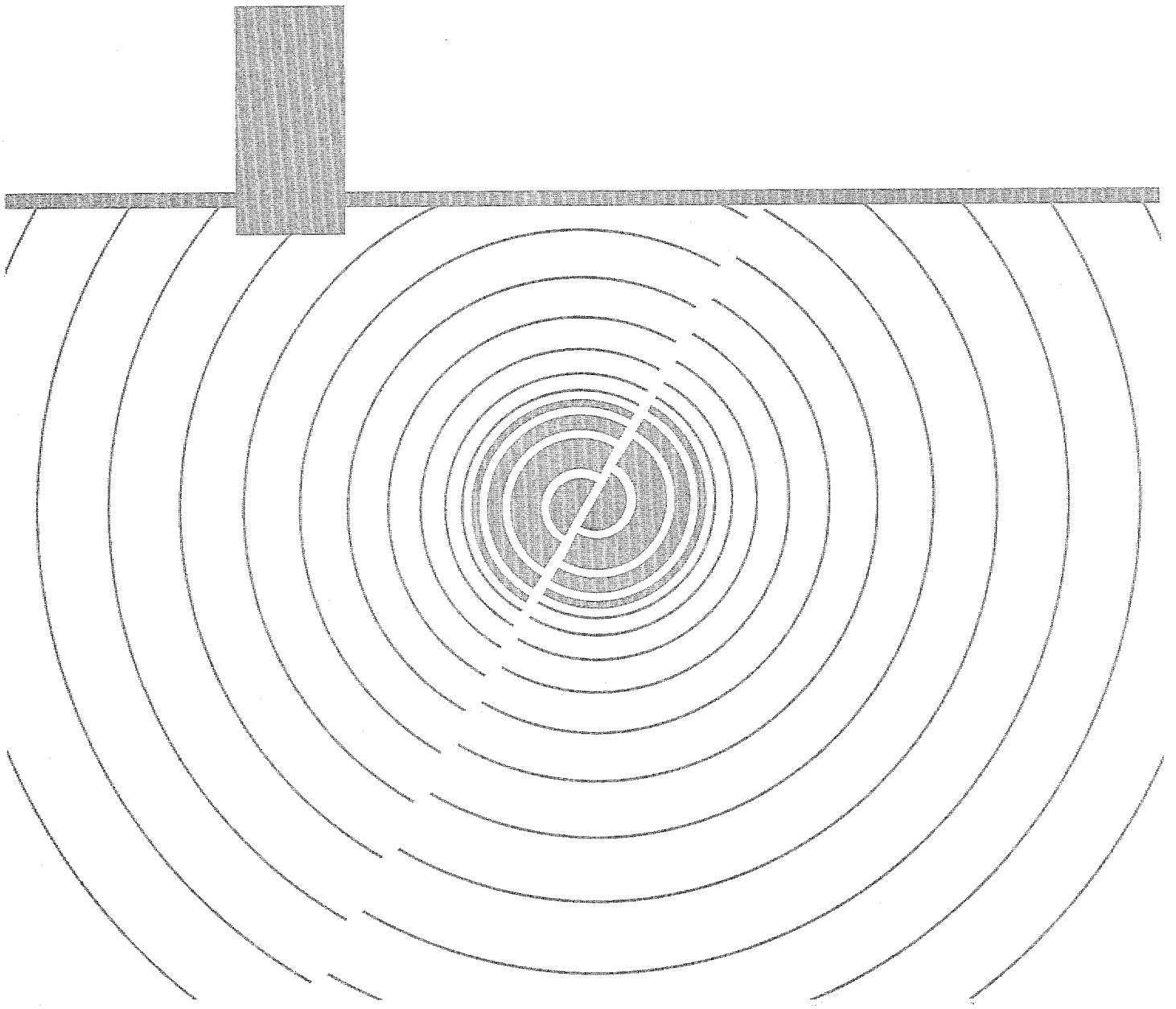
Appendix B: Examples of Various States' Building Code Practices



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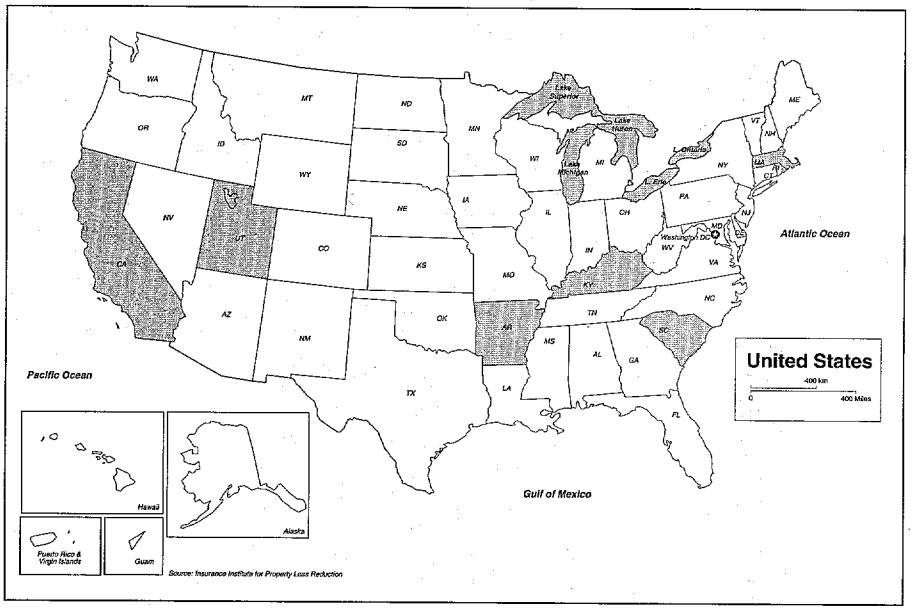

FIGURE B.1 This appendix describes the building code practices of Arkansas, California, Kentucky, Massachusetts, South Carolina, and Utah.

Code administration varies by state. As noted in chapter 4, some states require local code adoption, some have mandatory state codes, and others have no requirement at all. Typically where there is no comprehensive statewide building code the state regulates through individual standards some of the following: fire safety, building accessibility, manufactured housing, health facilities, swimming pools, schools, and plumbing.

The case examples given below demonstrate the wide range of practices used. States such as South Carolina and California have had building codes with seismic provisions for some time. Other states have recently adopted a statewide building code with seismic provisions. Usually, the move to adopt a statewide building code is in response to a natural disaster or serious fire. This illustrates the point that the best time to act is right after a disaster occurs. Awareness of the need for building codes is highest at this time.

In addition, the examples below describe the variety of practices used in administering codes and enforcement. Even though some states have building codes, their mechanisms for enforcement are poor. This is often the case in smaller communities that do not have an inspection staff and in states that have just adopted statewide codes.

Each state varies, and what works in one state may not work in another. The purpose of these examples is to give you ideas on what has been tried and how such a system might work in your state. The adoption of a statewide building code with seismic provision will save lives when an earthquake or disaster occurs.

The case study information was collected from the National Conference of States on Building Codes and Standards, Inc.,[1] augmented through a series of interviews. A list of interviewees is included at the end of this appendix.

Arkansas

Adoption and Revision

Arkansas' first building code, the Arkansas Fire Protection Code, adopted in 1955, applies to all buildings in Arkansas. The state fire marshal *is part of the state police department*, and is charged with enforcing the Arkansas Fire Prevention Code as well as other functions. Because of the code, the state must adopt the most recent fire and building codes from SBCCI.

The state fire marshal delegates plan review to local fire marshals as is permitted by the code. Local municipalities having building code departments can pass building

codes at least as stringent as the state's.

Code updates are determined administratively. New versions of the SBCCI codes are reviewed by the state fire marshal and a committee of design professionals, fire fighters, and others. The fire marshal's office makes appropriate amendments and sends the proposed code out for public comments. The recommended code is then approved by the state legislative council and sent to the secretary of state. There is no prescribed schedule for code update: The fire marshal determines when the code should be updated. Arkansas, generally, tries to update its code every time a new edition of the Standard Building Code (SBC) is published.

Seismic Requirements

In March 1991 the Arkansas General Assembly chose to emphasize the importance of seismic design by enacting Act 1100, "An Act to Safeguard Life, Health, and Property by Requiring Earthquake-Resistant Design for all Public Structures to be Constructed or Remodeled within the Boundaries of this State Beginning September 1, 1991." Introduction of Act 1100 in the legislature coincided with the aftermath of the Loma Prieta, California, disaster; and the bill passed with no opposition votes. It was signed by the governor on April 9, 1991.

The act requires that all "public structures" (buildings open to the public as well as all public works) be designed to resist seismic forces, in accordance with the minimum requirements of the 1993 revision to the 1991 SBC or the latest edition with revisions.

The act specifies the standard building code seismic zones to be used for each county, interpreted from Algermissen and Hopper's 1984 U.S. Geological Survey map.[2] The structural design must be signed and sealed by a professional engineer. The act does not apply to residential structures of four units or less, nor to agricultural structures. Another key element of the act is that it specifies a penalty of $1,000 per day of violation.

Although the state already has a building code, Act 1100 legislatively underscores that the state requires seismic design, establishes zones more specific than those in the SBC, is self-updating by the most recent published SBC, and sets forth penalties for noncompliance.

Enforcement

Some larger towns (such as West Memphis, Blytheville, and Jonesboro) have building departments and are well equipped to enforce seismic design and construction requirements. However, enforcement can be a problem in smaller communities that do not have inspection staff. Under Act 1100 enforcement mechanisms probably will continue to be poor. Still, the new Act puts much of the responsibility on professional engineers, who enforce the Act by their signatures on plans.

For some types of buildings (hospitals, schools, dormitories, places of assembly, department stores, etc.), the state reviews the plans if there is no local building official. All state buildings or state-funded buildings must be reviewed by State Building Services (the state architect's office). This requirement has only been in existence for the past ten years. A memo of understanding has been established between the Health Department and the Department of Human Services regarding regulations for hospitals and long-term ambulatory care facilities.

Code enforcement and plan review is relatively new in Arkansas. Prior to the 1970s, most enforcement and review was voluntary and conducted by

The Arkansas Earthquake Advisory Council and Act 1100

As mentioned in Chapter 4, seismic advisory councils can help reduce earthquake hazards in many different ways. The Arkansas example proves that point. Established in December 1984, with 17 members, the Earthquake Advisory Council consists of representatives from state agencies, utilities, universities, hospitals, local agencies, and other interested parties. The Council is open to additional members, if they can carry the Council's message to an important constituency.

The Council has been very successful in providing a forum for most of the major constituencies to get together and exchange ideas and alert one another to the latest news in the field. Without the Arkansas Advisory Council, Act 1100 would never have happened. The Council developed the idea several years before the bill was passed, drafted the bill, argued for seismic codes whenever members gave public presentations, and routed it through the legislature. Their strategy was to create both public and professional support.

The bill had been a high priority of the Council since its inception. Refined drafts of the bill had been in progress for about three years, and it was almost ready to be introduced. The timing of the bill coincided with the post-Loma Prieta disaster, and in November 1990 the bill was introduced to the legislature. The bill passed with no opposition votes.

private architects and engineers. The number of staff plan reviewers and inspectors depends on the size of the municipality, its location within the state, and its funding sources. A small city may have two to three inspectors, while a city the size of Little Rock has fifteen to twenty inspectors and six to eight reviewers. Localities most commonly charge for permits, plan reviews, and inspections and are thus capable of supporting a sufficient enforcement system.

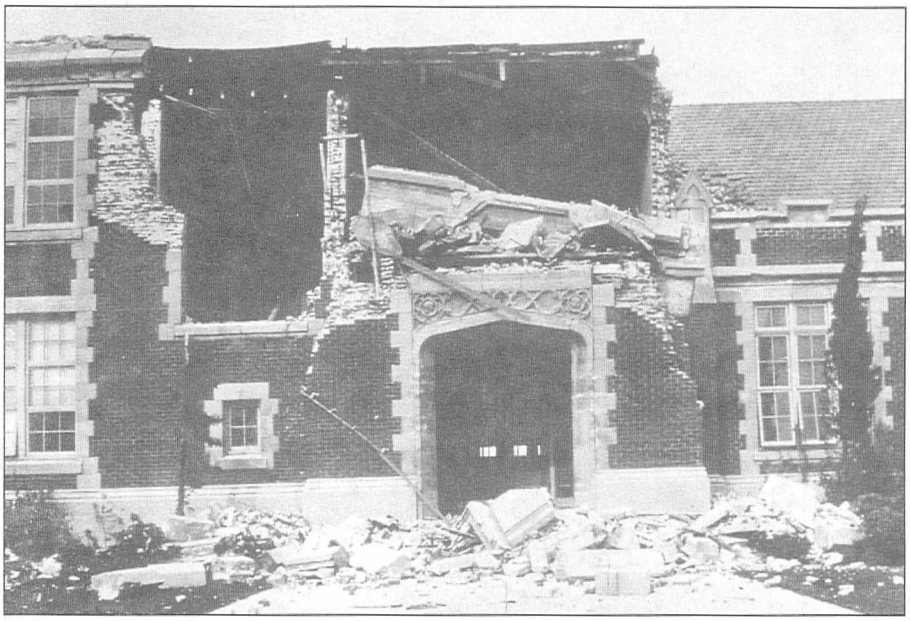

FIGURE B.2 This school building sustained severe damage in the 1933 Long Beach, California, quake. (Photo: U.S. Dept. of Commerce, NOAA)

An appeals system is set up within the state's code. If building permits are denied the builder may make an appeal to the commander of the fire marshal section of the Arkansas State Police, then to the appointed state fire marshal, and the head of the Arkansas State Police. If a municipality has a building department, it has the authority to establish a local board of appeals.

California

Adoption and Revision

The first California building laws, enacted by the legislature in 1909, established standards for construction and maintenance of tenement houses within cities in order to ensure the health and safety of the occupants of substandard housing. A combination code in 1923 encompassed tenement houses, hotels, and dwellings. Amendments in 1951 repealed many restrictive requirements and substituted more modern concepts and material ratings.

California has enacted statewide standards for housing, mobile home parks, employee housing, manufactured housing, energy conservation, fire safety, and handicapped access. There are additional standards for state-owned and -regulated facilities. Seventeen state agencies adopting or proposing building standards have specific authority to regulate construction.

Codes are mandated by state law. The legislature mandates, through the Health and Safety Code, certain uniform model codes that are applicable throughout the state. Local jurisdictions enforce the same edition of the model building codes as the state. California uses the Uniform Building Code (UBC) with amendments for general building and seismic codes.

The adoption of updates occurs only with the publishing of a new model building code, which occurs every three years. Proposed revisions are prepared and documented by the adopting state agency. Revisions then go through the state administrative procedures process of publication, public comments, and hearings.

Seismic Requirements

State and local officials in California have years of experience with seismic provisions. California has had seismic provisions since the 1933 Long Beach earthquake. The original regulations, known as the Field Act, covered public schools only. The UBC seismic provisions originated in the work of the Structural Engineers Association of California, and have been refined over the years primarily in response to California practice and experience.

In addition, California requires mitigation of earthquake hazards in unreinforced masonry (brick) buildings. SB 547, enacted in 1986, requires local governments to inventory unreinforced masonry buildings and to establish earthquake hazard mitigation programs, such as retrofit requirements, notification of building owners, and programs to reduce the number of occupants of unsafe buildings.

Enforcement

Local building departments are the primary enforcement agencies in California. The requirements charging local building departments with the administration of codes are stated in the California Health and Safety Code, which is enacted by the state legislature. Fifty-eight counties and 490 cities in the state have their own building departments, with plan review and inspection staff ranging from 1 to 350 people. The quality of enforcement varies. The State Department of Housing and Community Development may assume the responsibility of enforcement if local action is inadequate. Although the quality of local enforcement varies, for over twenty years the state has not had to exercise this option.

Local appeal procedures exist, usually involving a local housing appeals board. The local building official normally sits on the board. If the board upholds the decision of the building official, the appeal may continue to the next level of authority, such as the city council or county board of supervisors, and then, if appropriate, to litigation.

Kentucky

Adoption and Revision

Since October 1979 Kentucky has had a state building code, the *Kentucky Building Code*, which is based on the BOCA NBC. It is administered by the Kentucky Department of Housing, Buildings and Construction, which was legislatively created in 1978 as a response to the Beverly Hills Supper Club fire (this occurred in May 1977, killing 160 and injuring 130). The department combines all functions involved in construction of buildings. The Kentucky Building Code also includes the Kentucky Plumbing Code, Kentucky handicapped accessibility requirements, and Kentucky boiler rules. The department includes the Division of Building Codes Enforcement, the State Fire Marshal's Office, and the Division of Plumbing. Having these programs under one department has simplified coordination of the various codes.

The Board of Housing, Buildings and Construction is responsible for adopting and amending the code. The twenty-member board is appointed by the governor to represent the spectrum of interests related to the building industry.

The *Kentucky Building Code* is updated every three years, following the publication cycle of BOCA. Once the new edition of BOCA is published, the Department of Housing, Buildings and Construction analyzes the changes and takes administrative steps to incorporate BOCA into law within a few months.

Kentucky code requirements are mandatory throughout the state. Local jurisdictions may amend only the fire code, and only to make its requirements more stringent.

Seismic Requirements

Kentucky has always incorporated the latest seismic provisions of the BOCA code. With the 1992 BOCA code, Kentucky's code is now consistent with the *NEHRP Provisions*. As with other states in the eastern half of the country, enforcement and local awareness of seismic requirements still need improvement. Professional training pro-

grams and workshops may be necessary until adequate standards are attained.

Enforcement

Generally speaking, the state is responsible for larger buildings. The state reviews plans, issues permits, and provides inspection for these. The state employs twelve inspectors and nine plan reviewers. Smaller buildings and single-family homes are handled by local agencies. Kentucky has a Building Inspectors Certification Program, mandated by the 1982 General Assembly, under which inspectors must pass appropriate examinations to become certified.

Communities with qualified personnel can petition to manage all building permit functions themselves. Six of the larger cities and counties (including Louisville, Lexington, and Jefferson County) have done so.

The state depends on design professionals to sign and take responsibility for their plans. The department does not have a structural engineer reviewing plans, so it is particularly important for seismic design that a structural engineer sign the plans. The code's implementation depends on having architects and engineers accept responsibility for their designs. This code creates a common standard for building professionals across the state, an aspect very important to a rural state in order to ensure compliance by smaller communities.

Permit applicants may appeal decisions for any reason, and all appeals receive a hearing from a panel selected from among the twenty-member board. This system has been effective in ensuring a fair process.

Massachusetts

Adoption and Revision

In the late 1800s the Massachusetts State Police was empowered to enforce various laws related to building safety. By the early 1900s many local municipalities had promulgated their own building regulations. As a result of the Coconut Grove fire in 1942 (490 dead), a committee appointed by the governor recommended the implementation of a mandatory state building code, but no action was taken. In 1945 a commission again recommended a state uniform building code. Instead, a State Board of Standards was established in the Department of Public Safety with authority to prepare and propose building regulations for adoption by local municipalities.

In 1971 the board of standards adopted and promulgated the State Board of Standards Building Code, which was the 1970 *BOCA Basic Building Code* with certain amendments. In 1972 the legislature established a State Building Code Commission with authority to develop and implement a statewide uniform building code. The first state building code was legislatively adopted in 1975 to consolidate the 351 different codes that existed throughout the state.

The Massachusetts State Building Code is administered by the State Board of Building Regulations. The state uses the *BOCA National Building Code* with many amendments.

Law requires the code to be updated at least every five years, but typically it is updated every two years. Changes to the code are based on local needs rather than BOCA's publication schedule. Every May and November public hearings are held and administered by members of the State Board of Building Regulations. Anyone within or

outside the state can propose changes.

Seismic Requirements

Seismic provisions have been adopted and enforced since the first edition of the state building code in January 1975. Just as with other code provisions, the State Board of Building Regulations votes to adopt seismic provisions and local municipalities enforce them. However, the responsibility for design is placed on registered professionals. Any building 35,000 cubic feet or larger must be designed by a qualified registered professional engineer or architect, and reviewers generally defer to them. Massachusetts also has a structural engineering peer review requirement for certain structures.

The State Board of Building Regulations has several advisory committees, including one for seismic issues. The seismic advisory committee consists of ten structural engineers who volunteer their knowledge and time to adapt BOCA's code to the state of Massachusetts. The board updated their building codes in February 1997 based on the 1993 *BOCA National Building Code* and the 1992 *NEHRP Provisions*.

The Massachusetts Emergency Management Agency and the Board of Building Regulations and Standards have conducted professional development workshops for building officials on seismic construction. Approximately 500 building officials have received ATC-20 training for post-earthquake evaluation of buildings.

Massachusetts recently enacted an amendment regarding seismic safety in existing buildings. Massachusetts has numerous unreinforced masonry buildings that not only existed prior to the adoption of a statewide code but are historical in nature. The amendment requires a seismic study to be conducted on any existing building that experiences a change in use, a change in the occupancy numbers, or is substantially remodeled. The code then provides for the level of seismic upgrading required. This amendment was made effective in February 1997.

Enforcement

Every municipality is required by law to appoint a building commissioner to administer and enforce the state code. Very small towns are permitted to regionalize under legislative provisions, but they must still be overseen by a building commissioner. There are 351 building commissioners within the state.

Since November 1992 Massachusetts law has required the certification of building officials. Certification requires an exam and forty-five hours of continuing education every three years. Because the system grandfathers current officials, it will take approximately ten years for the effects to become apparent in local practice.

The law places enforcement responsibility with local building departments, except for state-owned buildings. Administration of building codes and enforcement for such buildings are conducted by district state inspectors with the Department of Public Safety. There are twelve inspectors throughout the state, each being responsible for thirty to thirty-two cities within their specified jurisdictions. These inspectors also assist local building commissioners and inspectors when necessary.

Massachusetts has more than 600 building officials throughout the state. The actual number of plan reviewers and inspectors for each city depends on the size of municipalities; for example, Boston has twenty-five building officials.

The State Building Code Appeals Board, a three-member board consisting of members of the State Board of Building Regulations staff, holds appeals hearings twice a month. Local appeal boards are permitted by law,

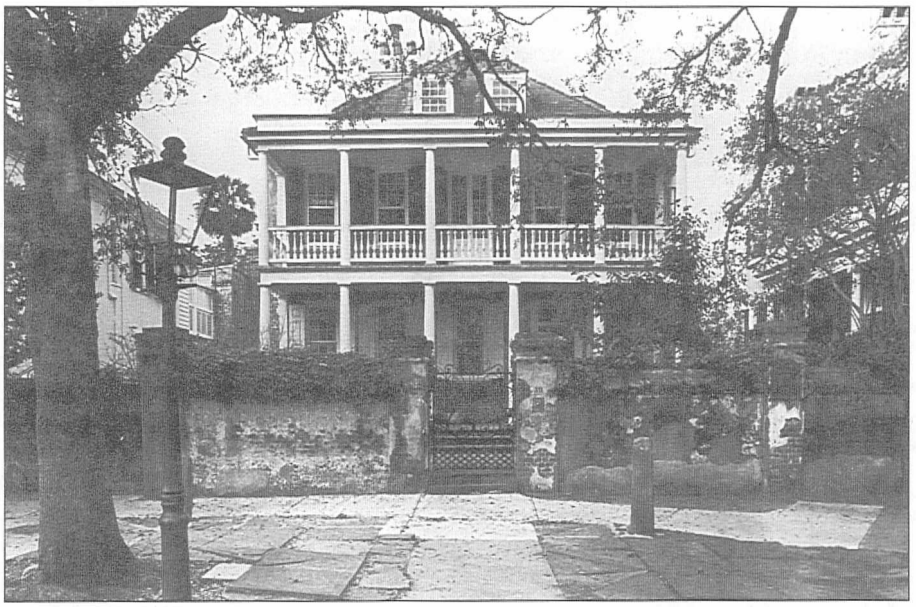

FIGURE B.3 The first building code in South Carolina was a document developed by and for Charleston in 1907. (Photo: The Charleston Area Convention and Visitors Bureau)

but only three or four exist. Most appellants take their appeals to the state. The appeals board hears approximately six to eight cases per hearing. Written decisions are administered within thirty days after the hearing.

South Carolina

Adoption and Revision

South Carolina has no required statewide code. Rather, it permits local use of the *Standard Building Code* (SBC). The first building code within the state of South Carolina was a document developed by and for the city of Charleston in 1907. The city of Columbia followed with its own local building code in 1916. By the mid-1960s a variety of building codes were in use throughout the state with little consistency in construction requirements, causing great confusion among architects, engineers, contractors, and others.

By act of the South Carolina General Assembly on June 21, 1972, the state authorized the SBC as its first state-approved construction document. This legislation allowed voluntary adoption of this uniform code. When local jurisdictions adopt a code, it must be the SBC. Thus, this requirement has gradually phased out all other codes in the state. When adopting the SBC, local jurisdictions must adopt the latest code in print.

The legislation prohibits local amendments to the adopted building code without approval of the South Carolina Building Codes Council. This unique system was intended to develop consistency in construction practices as well as provide design professionals with a single set of methods that would be acceptable to all jurisdictions in the state. Approximately half of the local jurisdictions in the state have adopted the SBC. Codes must be updated within a year of the SBCCI's publication of the revised SBC, which occurs every three years.

Table B.1 South Carolina Code Enforcement

Jurisdiction Population	Avg. No. of Code Enforcement Officers Per Jurisdiction	Avg. Population Per One Code Enforcement Officer
< 1,000	1	485
1,000–10,000	1.38	3,645
10,000–25,000	2	7,472
25,000–50,000	4.8	7,363
50,000–100,000	7.81	9,302
> 100,000	10.86	13,547

Seismic Requirements

Local governments adopt and enforce the seismic requirements of the most recent SBC. Many building inspectors and plan reviewers, however, still are not familiar with the seismic provisions. They often leave compliance to the design engineer who signs and seals the plans. Most municipalities in South Carolina simply have the engineer sign an affidavit or require him or her to take full responsibility for seismic compliance. The code permits this policy.

Larger municipalities have more knowledgeable building code staff. They also have more money to spend on plan reviews. Charleston, for example, pays more attention to seismic provisions than do local governments elsewhere in the state.

Enforcement

The administration of codes is entirely at the local level. Smaller municipalities sometimes contract building code enforcement to a larger county jurisdiction. South Carolina has a total of 327 code enforcement officers, including both plan reviewers and code inspectors. Of that number, 228 are certified professionals. Local jurisdictions determine the necessary number of code enforcement officers based on intensity of local construction activity.

The director of South Carolina's Building Codes and Related Services provided some recent data on distribution of code enforcement personnel, shown in Table B.1.

All appeals go to the local board of appeals, and there is no recourse to the state. If the owner still is unsatisfied, he or she can proceed with legal action against the city or county.

Public building construction is administered by the State Engineers Office, except for public school construction, which is administered by the Office of School Planning, a branch of the Department of Education. Staff members are licensed or registered architects or engineers and are required to pass the Standard Building Code Test.

Utah

Adoption and Revision

Utah adopted the *Uniform Building Code* (UBC) in 1988. Prior to this date each municipality adopted their own code (usually some version of the UBC), and there was inconsistency among jurisdictions.

The code is mandated by state law and administered by the Department of Business Regulation. The state legislature established a Uniform Building Code Commission under the Department of Business Regulation to conduct code updates administratively. The Uniform Building Code Commission meets monthly to consider requests for code amendments. Amendments are published on March 1 and September 1 of each year for changes enacted during the preceding six-month period. Code updates usually occur the year following ICBO's publishing of a new UBC. For example, the 1991 UBC was adopted in January 1992 and the 1994 UBC was adopted in 1995.

Local jurisdictions require state approval to amend the code. The Uniform Building Code Commission determines if proposed local amendments will be adopted or rejected and, if adopted, whether such amendments will be statewide or enforced only by the local jurisdiction.

Seismic Requirements

Seismic provisions have been adopted and enforced statewide since 1988, when the UBC was adopted. Prior to that some cities had no code, while others had already adopted the UBC and thus

had seismic provisions. The UBC seismic requirements have been widely used in Utah since the mid-1970s.

Seismic regulations are adopted by the state, but they are enforced locally. Larger cities, such as Salt Lake City, have adequate knowledge of seismic provisions. However, some smaller municipalities do not adequately enforce the code or do not have qualified personnel. The lack of state oversight is sometimes a problem. Cities and counties do not enforce requirements for school district buildings. Rather, the school districts themselves are expected to meet the requirements of the UBC, which not all are prepared to do.

Enforcement

Local municipalities are fully responsible for the administration of building codes. While the state has no plan reviewers and no building inspectors, everyone who inspects construction projects must be licensed by the state, which ensures a certain level of competency from building code enforcers.

The state board of appeals gets involved with appeals in jurisdictions with no local building code of appeals. Most local municipalities, however, have their own building boards of appeals.

NOTES

1 McIntrye, Marle, ed., *Directory of State Building Codes and Regulations*, 4th ed., National Conference of States on Building Codes and Standards (Herndon, VA), May 1987; and National Conference of States on Building Codes and Standards, *Directory of Building Codes and Regulations, State Directory*, NCSBCS (Herndon, VA), 1994.

2 See the maps by Algermissen and Hopper in *Estimation of Earthquake Effects Associated with Large Earthquakes in the New Madrid Seismic Zone*, Hopper, M.G., ed., U.S. Geological Survey Open-File Report 85-457, 1984, 42-51.

INTERVIEWS

Arkansas:
Parks Hamon, State Building Services, Little Rock (Spring 1994); Dr. James Blacklock, Department of Engineering Technology, University of Arkansas, Little Rock (June 4, 1991); Lt. Ray Carnahan, Commander, Fire Marshal Section, Arkansas State Police, Little Rock (June 3, 1991); Dan Cicirello, Office of Emergency Services, Conway (June 3, 1991); John David McFarland, Chair of Governor's Earthquake Advisory Council and Senior Geologist, Arkansas Geological Commission, Little Rock (June 4, 1991); and Owen Miller, State Legislator, Marked Tree (May 22, 1991)

California:
Ed King, Chief of Housing Standards, Division of Codes and Standards, Department of Housing and Community Development, Sacramento (Spring 1994)

Kentucky:
Jack M. Rhody, Director, Division of Building Code Enforcement, Department of Housing, Buildings and Construction, Frankfort (Spring 1994); Mike Lynch, Division of Disaster and Emergency Services, Department of Military Affairs, Frankfort (May 2, 1991); Charles Cotton, Commissioner, Department of Housing, Buildings and Construction, Frankfort (May 2, 1991); and Professor Mike Cassaro, School of Engineering, University of Louisville (May 3, 1991).

Massachusetts:
Brian Gore, State Building Code Regulation, Boston (Spring 1994)

South Carolina:
Gary Wiggins, Director, South Carolina Building Codes and Regulatory Services, Columbia (Spring 1994)

Utah:
Lawrence Reavely, Department of Civil Engineering, University of Utah (Spring 1994); and Roger Evans, City of Salt Lake City, Building Permits (Spring 1994)